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Editor of ORGANIC GARDENING

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With The Editor

Seeds As Human Food

MOST of my readers will recall my article on the sunflower seed which appeared in the April 1944 issue of Organic Gardening. There have been so many new readers since then, however, that I will briefly review some of the facts about this article.

When it became known that the people of Deaf Smith County, Texas had such marvellous teeth, it was found that it was due to a layer of minerals underlying the soil consisting of calcium, phosphorus, and fluorine. A New England dentist who heard about this began experimenting with bone flour (ground up cattle bones) as human food, since bone flour is rich in calcium and phosphorus and contains fluorine. He fed it to a group of patients in an institution for the insane and succeeded in immediately arresting the formation of cavities.

When I heard about these things the thought occurred to me to check up on the analysis of sunflower seeds. This plant greatly fascinated me because of its propensity to turn with the sun all day. The seed-head seems to be constantly drenched with sunlight. To my amazement I found that the sunflower seed was exceedingly rich in calcium and phosphorus and contained fluorine. In experiments I found that the eating of a couple of handfuls of these seeds daily could cure bleeding gums, and cleared up certain conditions in the eyes. It also made for a smoother skin.

If the sunflower seed can do this, is it because it is a seed as against being a leaf or stalk? Would other seeds be able to do the same thing for us, and if so, why? I began to delve into this fascinating subject and have amassed a great deal of evidence which proves that nutritionists here have a new field for research. While they talk glibly of the advantages of a varied diet they have almost completely overlooked seeds as a distinct group in the category of foods.

Seeds are alive. If planted they will grow and, therefore, they must contain life-giving substances. If you plant a piece of spinach it will merely decay. Of course I do not recommend that we eat seeds exclusively. Spinach has food value, true, but seeds contain a spark, a fire which no doubt is a very vital necessity in our digestive processes.

Nature is interested primarily in the perpetuation of the species which she accomplishes through the propagation of the seed. The plant starts from a seed and finishes up as seed. When finally the leaves

and stalk wither, the remaining vital organic elements are rushed from there to the seed. You can see then how important the seed is in Nature's scheme or cycle of life.

This living substance in the seed can be preserved for many years, and during the entire life of the seed, which in the case of certain legumes is more than fifty years, there is a continuous respiratory action, showing that it is a living organism. The seed of the Indian lotus plant buried for over 200 years in peat bogs has been known to germinate successfully. Melon seeds carefully stored, packed between paper, have germinated after thirty years. There must be very important life-giving elements that will resist the passage of such long periods of time and this should make a very healthy food for homo sapiens. All seeds are rich in vitamin B, and the sex and fertility factors. That is why the wheat germ is fed to women who do not seem to be able to bear children.

I am not going to burden you here with much technical data, but the data collected by scientists on the value of whole grain already *prove* that seeds are a wonderful food for man. The only trouble is, due to the specialized fragmentary nature of present-day scientific research, they have not thought of linking up their findings in this field of nutrition to the wide realm of botany with its innumerable varieties of seeds. What a wonderful field for discoveries!

For example, an experiment was performed where the effects of the use of a chemical fertilizer, superphosphate, was measured on a crop of alfalfa, in comparison with a similar crop on which no fertilizer was used. It was discovered that all the inorganic phosphorus of the fertilizer went to the stalk and leaves. The amount of organic phosphorus in both crops of seed was alike, because the seed rejected the inorganic phosphorus. Nature cannot build a good race of alfalfa plants by permitting too many minerals of inorganic origin, to find their way into the seed. The plant will forage about, and most of the "organic minerals" or minerals that already had formed part of an organism are probably saved for the seed. If sufficient organic elements cannot be found, the plant will either produce seed which anyone can see with the naked eye is defective, or it will not produce seed at all.

This is an extremely important point to be carefully considered by my readers. Those of you who are worried about having to purchase food raised with chemical fertilizers, should see to it that a certain portion of your diet consists of seeds, because the seed is not anywhere nearly as much affected by the use of strong chemicals as the leaves or stalks, and contains thus significant amounts of organic elements.

Luther Burbank, the great plant wizard realized the value of the seed as human food, but he merely mentioned it casually and then proceeded to forget all about it. In his book *Partner of Nature* (Appleton-Century-1939) he stated, "Fruits ripen, not to make food for us, but to encase and protect the seeds inside—pips or pits or kernels.—But we pay no attention to Nature's purpose and revel in the delicate flavors and delicious flesh of apples, pears, peaches, tomatoes, melons and all and throw aside carelessly the seeds that the plant went to so much trouble to build and in which it stored the life-giving germ and a reserve of starch to help it start in life again as a baby plant."

It has been said that the apple seeds contain more nutritional value than the rest of the apple, yet we

usually throw the seeds away. For a long time now I have made sure to chew up thoroughly and eat the seeds of the apple and the orange. I have lately added pumpkin, wheat and poppy seed to my diet. Recently we purchased celery and caraway seeds at the A and P, packaged for culinary use. We are trying to obtain advertisers who sell seeds for edible purposes so our readers may know where to purchase them if they so desire. Where seeds are sold for growing in the garden they may have been treated with dangerous chemicals so please do not rush to your garden seed packets for a snack.

It is very interesting to search about for seeds that are practical for eating purposes. Nuts, for example, are a seed and one of the best, but must be thoroughly chewed before swallowing. Here again is a more or less safe food for the organically minded person, because no poison sprays can touch the meat of the nut, since the shell is thrown away. Did you know that the coconut is one big seed? All the inside white matter is a seed. Coconut trees usually grow on beaches and are bound to contain rare mineral elements absent from inland plants. Nature designed the coconut so that it will float on water. When some of these nuts fall, they will float to neighboring islands and "take" there. It is part of Nature's idea for perpetuating the species. You all know of the hundred and one other methods that she uses to spread the seed, such as the dandelion's fluffy ball, the wings of the maple seed, hooks and spines to prevent cattle from eating the seed, etc.

Then there are squash and pumpkin seeds, and that of the cantaloupe. A delicious candy ball can be made with grated coconuts and sesame seed. This latter will not be available till after the war as it comes from Egypt and Arabia where it is a staple part of the diet. It used to be sold in big cities like N. Y. and Chicago. Let us consider two items of fruit,—the date and the fig. The stone pit of the date is thrown away, but each fig contains hundreds of seeds which you eat and which are said to be excellent for constipation. Some of these seeds pass untouched through the digestive system, but some are masticated. In eating figs an attempt should be made to "chew at" these seeds.

There are many herb seeds which it has long been known are extremely beneficial to the body. These include anise, basil, caraway, coriander, cumin, dill, fennel and senna. Every gardener should provide space for a little herb garden. Celery and parsley seeds are highly recommended by physicians who have experience with herbs and so-called botanical food products.

A wonderful seed dish consists of coarsely ground wheat and milk cooked in a double boiler for about an hour. It not only makes a delicious dish but is a substantial part of a hearty breakfast, in the place of a factory-produced packaged cereal. It is best to grind the wheat in a home-type grinder, in small quantities and be sure that the wheat hasn't been treated with dangerous chemical preservatives.

To anyone bothered with constipation the eating of seeds will be a boon. The question of swallowing certain kinds of seeds that might irritate intestinal passageways, such as grapes might, however, be referred to your physician if there is a record of digestive troubles. But the vast majority of seeds pose no unusual problems.

Remember that sunflower seeds are one of your best dietary bets. Chew up a few nuts every day. Learn to crunch up your orange and

apple seeds. These are far more natural than vitamin pills. Seeds are rich storehouses of vitamins and other rare as well as undiscovered substances.

Before closing on this subject, I want to recommend another type of food to those health-conscious readers who desire to get the benefit of the best type of foods, and that is sea-going fish rather than fish from inland waters. These latter, in many cases have to live in water filled with pollution and other dangerous waste matter. Ocean fish eat a healthy diet, in which strong chemical fertilizers do not take a part.

J. I. RODALE

Teeth And Diet

From The Field Magazine (England) Jan. 6, 1945

I was interested in your letter from "Dental Surgeon", because my seven-year-old son and I have only just paid a routine visit to the dentist. He seemed quite unusually impressed by the excellence of my son's teeth and asked me if he had had any special diet. I told him: No. That he had eaten no meat (including eggs) up to the age of three years, but since then had eaten meat and exactly what he liked. I added, however, that we grew as much of our food as possible on composted soil and that for more than his lifetime we have never used an ounce of artificial fertilizers.

"You have given me the answer," said the dentist. "Now I understand why he has teeth like that."

In my own case, my teeth used to collect huge quantities of tartar. Every year it had to be scraped off. We began using compost instead of artificials towards the end of 1936. When I went to my dentist in 1942, after a lapse (I am ashamed to say) of two-and-a-half years, I expected a terrific scraping to occur. There was no tartar to remove. Another two years elapsed before I went again, this last time. There was a very little tartar behind two teeth, and that was all.

We have used compost for just about eight years, and for the last five of those years my teeth have lost their unpleasant habit of collecting tartar. Is this a coincidence? It might be. But I was telling this story to someone else, and she has had exactly the same experience. Incidentally, I asked the dentist if war-time diet could have anything to do with it. He did not think it had, because he finds now just as much tartar collecting on his other patients' teeth as before the war.

L. F. Easterbrook
Phillis Mead,
Treyford, Midhurst, West Sussex.
(Brought to our attention by Sir Albert Howard).

Artificials and Sprays are Not Used Here

How compost plays an important part on 295 acres of Lincolnshire silt land from which last year produce to the value of £19,412 was sold.

By a Special Representative

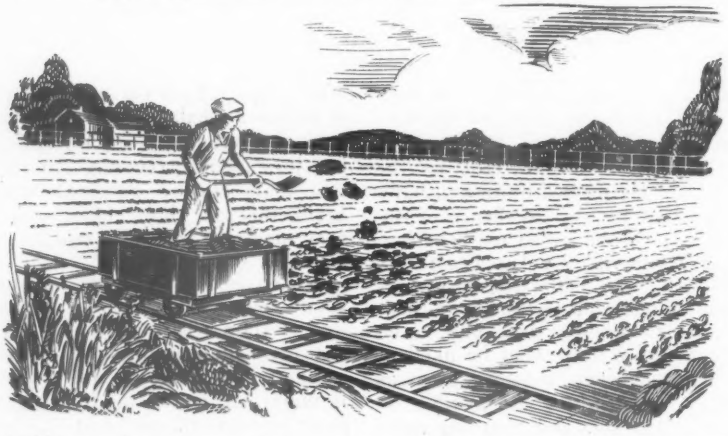
HOW intensive production, so high as to give sales amounting to £19,412 from 295 acres, can be achieved as a system that has required no change in wartime was what I was privileged to see on a visit to Capt. R. G. M. Wilson's Iceni estate at Surfleet, Lincs.

This estate, bought in the autumn of 1931, was by no means fully productive and carried a labour bill of approximately £10 per week in addition to the owner himself who lived on the place. Apart from the farmhouse the only living accommodation on the estate was a pair of wooden bungalows.

To-day the labour bill averages £175 per week, and the living accommodation for the staff consists of the manager's house, 9 brick-built cottages, 5 wooden bungalows and the old pair renovated, as well as a club room.

In permanent employment there are 33 men, 9 women, 15 boys (up to 20 years), of whom approximately half live on the estate.

In 1931 the crops on the farm consisted of a certain amount of corn, a few acres of potatoes and roots for fodder, and some grass.



"Home-Grown" Fertility

Here we see a start being made to turn a pit of compost. A light railway runs through the nursery and in the picture it can be seen how useful it is both in collecting and distributing compost in addition to transporting produce. Workers also find compost spreading

easier than unrotted yard manure.

This year, 1941, the crops are:—

	acres
Wheat	62¾
Oats	33
Beans	8
Potatoes	65
Roots for stock	16
Clover	23
Short-term leys	42
Horticulture	45¼

The acreage under horticulture consists of about: 1 acre glasshouses, 3½ acres (9,000 Dutch lights) for early lettuce, carrots, etc.; 1½ acres cordon apple trees and a small quantity of soft fruit, 3 acres bulbs, 5 acres flower garden (now mostly vegetables), 31¼ acres vegetables.

The farmland is worked on a rotation to maintain its fertility, the only crops for sale being wheat sold for seed, and potatoes for human consumption and seed.

One tractor, a John Deere, and 11 working horses are employed. About 20 cows are now being kept for breeding and rearing calves, the pedigree Shorthorn herd having been moved to Scotland.

The sales for 1940 amounted to no less than £19,412, made up as follows:

Vegetables	£10,054
Fruit	£ 544
Flowers	£ 2,209
Glasshouse produce	£ 2,268
Farm produce	£ 4,337

The whole estate is organised as a complete unit and as far as possible self-supporting. The management is conducted by a committee of no fewer than nine departmental managers under the manager, Mr. A. G. Stocker.

"This committee, co-operating to make the whole estate a happy concern, is an outstanding success, wrote Capt. Wilson in a recent booklet,* 'I Believe.' The general keenness on the estate proves quite conclusively that the rate of wages and hours of working are not the paramount considerations where men are given an occupation which is mentally and physically satisfying."

Thoroughness of Cultivation

After a full day on the farm I am in entire agreement. Hitherto I had thought that such thorough cultivation was a dream incapable of fulfillment.

However, not only has the Iceni estate survived ten years on which most farmers do not care to look back, but it has gone from strength to strength, and surely its chief merit lies in the fact that no radical change has had to be made to suit war conditions. What is more, it is no hobby or sideline of a rich man, for there are in the Fens 7,000 acres managed on a similar system.

Compost as a means of increasing soil fertility was the chief reason of my visit to Surfleet. Our increased arable acreage and threatened reduction of live stock demand that attention be given to the use of waste vegetation to increase fertility.

Quality and health in crops can only be appreciated fully by inspection. If, however, the all-round excellence of Iceni crops could be demonstrated on a national scale composting would have a regular place in British agriculture were dung and artificials ever so plentiful.

For all practical purposes the farm is self-supporting in animal feeding stuffs and fertilizers. Whatever fertilisers are bought are organic, specially blended and added to the compost.

All vegetable waste goes to the compost pits for mixing with farm-

yard manure. Here it not only increases the supply of soil nutrients but as compost becomes a permanent addition to the soil.

Compost, it is contended by Dr. C. Mirbt, scientific adviser, adds life to the soil, for it brings its own bacteria and is immediately ready to start feeding the crop. Its humus content gives rootlets easy access to the fertility.

Probably it is both humus and bacteria that make the silt land of the Iceni estate so pleasant to handle. At a touch it crumbles to a fine mould.

Dusting Not Necessary

About the health and quality of the crops I have remarked before; but the extraordinary part is that the sprays, dusts and such like which form so formidable a part of the nursery man's armoury against pests are never used at Surfleet. This is all the more remarkable since a part of Capt. Wilson's early life was spent in connection with a firm who specialised in pest controls.

In ten years even the potato sprayer has been used only twice—except by neighbors. Indeed, potato tops are a regular contribution to the compost pits.

This in itself would be a satisfactory answer to what might be a reasonable fear that the use of vegetable waste could spread disease. A more complete answer, however, is afforded by the six large tomato houses.

Tomato Leaf Compost

The heavy trusses of fruit were no commonplace sight, and I was astounded to find that they were grown on a compost composed of last year's tomato plants and yard manure.

Nothing else had been used, but in the last few weeks of fruiting they will receive hoof and horn meal in solution—merely because it is impossible to charge the small piece of ground which each plant occupies with sufficient food to bring such a heavy crop to full maturity.

For outdoor vegetables about 15 cartloads of compost per acre is the usual dressing. A limit, however, is set by the supply, which can never be too plentiful. On the other hand, I imagine it is impossible to use too much for balance is never upset. On seeing the crops one is struck by the clean growth; although the yield is big there is no evidence of stimulation such as can usually be seen after heavy manuring.

As an example, I mention wheat. I saw a winter variety that was sown on March 4. It had caught up time so that it was slightly ahead of the average, yet it was in no way coarse. Colour was good; the plant did not carry any suggestion of possible lodging.

Home-grown seed, as far as possible, is another feature. The idea is that the seed should be grown by the same methods that are to be used on the crop. The same reason underlies the recent purchase of a farm in Scotland.

The actual composting I found to be simpler than I imagined. It goes on throughout the year and up to 1,000 tons are used.

Pits of Sandwiched Material

Pits, 36 ft. long by 14 ft. wide by 3 ft. deep are used. About three-quarters of this area is filled sandwich fashion with weeds, vegetable trimmings, leaves, tree prunings and farmyard manure.

Four inches of dung is the first layer and then four inches of vegetable waste followed by a good sprinkling of earth from around the pit and containing wood ash and chalk, if available. These layers are

continued until the material is about a foot higher than ground level, the last layer being farmyard manure sprinkled with earth.

Along the bottom of the pit are two airways which have a chimney-like outlet at one end. When the material is well heated it is thoroughly turned, this being the object of leaving a quarter of the pit unoccupied.

Compost, however, is also made without the constructed airways and without digging a pit. This begins with an oblong layer of vegetable matter 10 ft. by 5 ft. and 6 in. deep, covered with two inches of farm manure following by a scattering of earth. The same procedure follows until the heap is 4 ft. to 5 ft. high, with trim vertical sides.

Ensuring Ventilation

Ventilation is provided by means of two vertical holes, 4 in. or 5 in. in diameter, driven through the heap with a crowbar. It is kept moist and preferably sheltered by hedge or wall. At the end of a month it is thoroughly turned, outsides going into the middle and the holes being remade. Turning is repeated a month later and at the end of three months the compost is usually ready for use; but there is no great harm in leaving it until required.

Town dwellers are urged on all sides, as part of the war effort, to save all kinds of waste material to help in the manufacture of aircraft, munitions, and so forth. The composting of vegetable waste is a form of saving which those on the land can put into practice to help themselves in the production of food, without which all arms are useless.

It is not unlikely, also, that what might start as war saving would become a regular peacetime practice.

**From 285, Milton Road, Cambridge, price 6d., post free.*

Cover Photograph

THE cover was taken by one of the country's foremost photographers, Edgar T. Clewell, Allentown, Pa., who certainly knew how to capture the spirit of the moment. On the Rodale farm, last year's potato crop was grown from uncut seed. The yield was accordingly much higher than when seed potatoes were cut. Nature never cuts seeds, after all.

As every planter should know, the tail end of the seed potato, where it grew from the vine or root, has no seed, but just feed value. While it is customary to divide the top into pieces with two or three eyes each, it is, nevertheless, common knowledge that complete tubers give higher yields because they start the vegetative growth more quickly and fully, thus increasing the leaf surface of the plant, which in turn assimilates from the air those starches which go into the new crop. The only reason why cutting is at all practiced is the cost. The home gardener on organic principles will find it sound practice to use choice whole potatoes for seed and thus to increase his yield on small plots by as much as 100%. M.

Return To The Land

I.

The scientific question.

By HEINRICH MEYER, Ph. D.

WE have much authority to support the tenets of Organic Gardening; every mail tells of new experiences and brings testimony to bear on the necessity of humus, the bacterial life of the soil, the action of the earthworm, and related matters; Sir Albert Howard, relying on his wide experiences and endowed with that rare gift, a scientific imagination, with the scholarly background of an agronomist, has summarized both his findings and his hypotheses in books and papers. And yet the humus theory is not accepted by all. Why do others not benefit by our experiences?

This poses the principal scientific question which we must face clearly and boldly if we hope to change the wrong course that agriculture and horticulture have taken under the influence of chemical theory. Of course, no authority will outweigh tradition; and chemical agriculture has become a tradition, which is the more firmly rooted as it enhances momentary yields at the expense of sustained fertility. But apart from the relatively recent authority vested in chemicals and synthetics, an authority contested by the practice of thousands of years prior to Liebig, the scientific approach demands more than authority; it wants proof.

J. I. Rodale has therefore begun to plan for extended investigations, for which the Rodale and Meyer farms will be the first nucleus. Foolproof scientific experiments will attack the question. Before we embark on the execution of this far-reaching project, it may be well to recapitulate some general principles and to formulate some hypotheses; for it is more important to find questions than to get answers.

Under the heading "Return to the Land" we wish to have understood two separate, yet closely related features of man's connection with the soil from which we all spring: Our growing awareness of the soundness of that *Rural Life*, under which the human race evolved through millions of years until, only within the last century, it began to forget its own roots in the soil—this is the human side of the return to the land: Organic living. Coupled with it is the realization that, with the rapid growth of mankind during the last hundred years, the land has been mined and depleted as never before. We have taken from the soil much more than we have returned to it. We are only now beginning to discover that we will not be able to continue as we have started; we must return to the soil what we have taken from it.

It is easy to say that the majority of our agronomists who believe in the sufficiency of synthetic fertilizers cannot be wrong; but *science*

is always wrong. This is a strange paradox, for in the schools we were taught that science promotes knowledge and truth, that science is always right, and the layman without scientific training is only too ready to adore "Science" with its ever new discoveries. The active research worker, however, takes a different attitude, and the better he is, the less authority he will acknowledge; by the same token, the more sceptically he will look at theories generally believed. Science is always wrong—because it does not want to be satisfied.

Before we discuss our specific problems, it might be well to imbue the reader with a general spirit of scepticism and doubt; for only from such doubt can spring the creative questioning which will yield reliable results; we cannot carry out these experiments without the help of many likewise minded. Let us look at a few instances where science was wrong or where science is inadequate, especially chemical science.

For thousands of years, European farmers watched for full moon and new moon to start planting, for a hundred years science sneared at those "superstitious peasants". But a year or so ago, investigations were published and widely publicized which proved that with the change of the moon phases the electrical potential in plants showed signal variations. While science did not admit the error it had committed against the 'belief' of experience, it came close to it.

For millions of years, the human race evolved under varying conditions of food; about a hundred or so years ago, the chemists decided that the human body needed proteins, fats, and carbohydrates. Unfortunately for the chemists, many people believed in this assertion and lived by it; before long they developed the well-known deficiency symptoms which formerly had only occurred on whaling ships or polar expeditions; it was clear that the human organism required more than the famous three compounds; science created a word before it fully knew what it was looking for: Vitamins were "discovered". As a result, people became vitamin-conscious and forgetful of the fact that the human race lived for millions of years without ever swallowing a single pill or capsule. It is safe to predict that in another thirty or fifty years, a second only in the life cycle of a species such as ours, vitamins will be over-thrown and a new compound will have been found to be essential. This prediction rests on sound organic ground: It is unnatural to deprive food of some of its components and then to synthesize chemically the parts taken out and to add them at greater cost. We do not know all the parts we take out, we certainly add something different when we rely on chemical analysis.

It is rather amusing to notice that animal nutrition is up against the same situation. In South Africa as well as in other parts of the world, including the United States, cattle did not thrive so well when fed phosphates in the mineral form as when fed grass grown on soil enriched with the same mineral. The indirect approach which is the natural one, under which animals developed through the ages, proved to be the sound and successful way: Animals were accustomed not to refined pure minerals, but to minerals in organic form, in colloidal form, as part of the plant tissue. This is a strange parallel to the food value of pure white sugar, white flour, and similarly "refined" foods for humans. But just as humans, living on concentrated rich food, develop sooner or later health troubles of

various sorts, so do cows which are fed a diet too rich in protein develop symptoms of poisoning: they require roughages, which means: they prefer to derive a certain amount of their proteins from plants that contain also other substances. After all, there is not only "protein", but there are as many proteins as there are different people and plants and animals. Likewise, the chemical analysis of feeds which is handed down through the textbooks, though the methods are strictly chemical and of a computative nature, proves nothing in general: Actual feeding tests always show that every individual animal utilizes the feed differently and requires therefore different combinations to be fully satisfied.

Finally, let us look at soil analysis. We would not ask the chemist to tell us which radish tasted better, which apple was sweeter, which lettuce crisper, and which rose more fragrant; we would trust our nose and our taste, which are finer judges than any chemical laboratory, because they discover what no chemist can even name. When a chemist produces a perfume called honeysuckle, it is as different from the natural honeysuckle as a violet is from gasoline fumes; nor has any nose ever smelled lily-of-the-valley as pungent as the synthetic derivative used in skin creams; nor has any peppermint ever been as strong as menthol nor sugar as sickeningly sweet as saccharine. But when it comes to that enormously complicated structure SOIL, a phenomenon with geological, chemical, physical, biological, and other dimensions, the modern gardener is inclined to ask the soil analyst before he asks his real testing sets, his plants. All soil tests differ as to results, but none tell us what will really happen to a given plant.

It is for this reason that in Germany, where most of the present soil tests were originally designed, at least in their earlier forms, the chemical soil analysis was finally discarded in favor of biological testing: Plants were grown in soil samples; plants themselves must tell the capacities of the earths to be tested. This takes time, but is absolutely sound scientifically. Our agronomists and fertilizer specialists are always inclined to deprecate organic materials because they contain so often the chemical substances, thought to be essential for plant food, in smaller percentages than do the synthetic fertilizers; the same specialists add, however, that these organic substances at best improve the physical condition of the soil. They do not seem to realize that chemistry has long gone beyond its early stage of inorganic analytics; that, in colloidal chemistry, the physical and chemical properties are much more closely interlinked than before; that in actual statistical surveys the defamed *physical* properties proved even to be the decisive ones. Of course, gardeners and farmers have dug and fertilized, composted and manured, spaded and raked, plowed and mulched for thousands of years, never separating the physical from the chemical activity; but it remained to a meadow survey conducted over a decade ago in Holstein to show that the physical condition of the soil, the colloidal condition of the land, rather than the quantitative distribution of chemicals determined its fertility; chemicals were "available" for the plants to the same degree as the soil particles became finer and more humose. One meadow in Holstein had startled the investigators because it had for over three centuries been a pasture, though its fertility and the number of stock it carried was not evident from the chemical analysis,

even though the nutritive grasses growing there (under slightly acid conditions, by the way) proved biologically the value of the land. It was then discovered that soil consisting of the greatest number of fine particles held by organic matter was the most fertile soil. The statistical analysis of over a hundred and thirty meadows revealed that this "physical" characteristic determined the feeding value of a meadow and thereby its carrying capacity, while moderate acidity or neutral pH had no nutritional effect whatsoever, except on the types of grasses found in varying associations.

On the basis of these general as well as special phenomena, we shall follow strictly biological methods in our experiments. We know that the investigations of Sir Albert Howard will thereby be carried forward, but we also know that the work of the best minds in our own Department of Agriculture will thereby be furthered and corroborated. It was Curtis Fletcher Marbut, Dr. Bennett of the Soil Conservation Service, and Dr. Morgan, former TVA chairman, who looked at our land as a historical phenomenon, not as a chemical combination of elements. Marbut and Bennett have taught America how to appreciate our soil as a growing thing, deriving from disintegrating rock underneath, reflecting all subsequent experiences with plants, crops, and management, warning us of depletion and of the disintegration of profiles by the well-known signs of increasing infertility. They have taught us, that we must *return to the land* those organic substances which the land produces for us and other living beings; they have also contributed to that deepening philosophy of *our* Return to the Land, which Gove Hambidge so charmingly advocated, a philosophy without which all scientific investigation is useless; for we are protecting the future of the land, our soil, our land. We do not seek forced yields for the moment, but the permanency of American earth—for the good of all humanity.

(This is the first article in a series dealing with the scientific principles of Organic Gardening and Living).

Anything Can Happen

We are very happy to announce to our readers that Mrs. George Papashvily, co-author of the current best-seller *Anything Can Happen* is the author of the piece "Compost and The Orchard" that appeared in Organic Gardening under date of April, 1943 and published under her maiden name of Helen L. Waite. This is a book that our readers should not miss reading. It is wholesome, humorous and will give you a tremendous lift. *Anything Can Happen* was the choice of the Book-of-the-Month Club and was purchased by RKO for the making of a moving picture.

Helen and George Papashvily are Organic Gardening enthusiasts and have not used chemical fertilizers on their farm for many years. This book is on sale at all book stores.

She also wrote the article in the May, 1943 issue of Organic Gardening called, "Sawdust as Fertilizer."

Hints For The Victory Gardener

This is the twenty-eighth of a series of articles by this author dealing with the cultivation of ordinary vegetables.

CANTALOUPES AND WATERMELONS

By ROGER W. SMITH

EVERY good garden should provide some delicacy grown as a special reward for the hardworking gardener. Many gardeners now raise a few cantaloupes or watermelons and enjoy the exquisite flavor of really fresh, vine-ripened fruit.

The name "cantaloupe" is generally used to designate a small, round, netted type of *muskmelon* especially valuable because of its ability to withstand long shipment and unfavorable delay. Other much more desirable strains of muskmelons are available to you for home garden cultivation.

The muskmelon (*Cucumis melo L.*) is a native of India. No doubt it was highly prized long before recorded history. It offers you a very wide choice of types some of which may be ideally suited to your locality. But no matter which type you select, an understanding of the growth habits and requirements of the plant will be helpful.

The muskmelon plant requires much room. It prefers a rather light, well drained, soil which contains ample organic matter. If the soil of your garden is heavy (clayey) this condition may readily be corrected by the addition of a mixture of clean sand and properly composted humus dug in lightly over the area where the plants are to be grown. A very sandy soil may be improved by a very heavy application of compost humus. Well rotted manure may be substituted if necessary. It requires a liberal amount of lime.

After the soil has well warmed up, been well dug and properly pulverized, the hills should be prepared. These should be sixty inches apart each way so as to allow ample room for the long trailing vines. At the spot where a hill is to be placed, a hole should be made large enough to receive at least one bucketful of mature compost humus. When the hole is level-filled three widely spaced seeds should be placed and covered with a half inch of finely sifted top soil. The spot should then be carefully firmed.

It is well to mark each hill by driving into the ground close around it three or four stakes to stand about a foot high. Later, a square of cheesecloth may be placed over these stakes to form a small tent. This tent will effectively defend the young plants against attack by insects especially disease bearing, striped cucumber beetles. If the edges of the tent are covered with topsoil, beetles will be unable to

crawl under them. This covering should, of course, be removed just as soon as the plants begin to crowd.

Very soon after the plants are up they "run" and the speed with which the vines grow is usually quite great. Before the plants cover much space, it is wise to remember that they are also forming very wide-spreading, shallow root systems. To keep down weeds, to avoid root injury through cultivation, but above all to encourage healthy plant growth, a mulch of rough compost material should be spread widely around each hill.

Strong growing, healthy plants are seldom badly infested by insects. Aphids sometimes attack in force. They almost invariably begin these attacks at the tender tips of the vines, and are easily controlled by a dusting of fine wood ashes.

What type of muskmelon will give best results in your garden? Generally speaking, this selection depends largely upon the number of warm summer days in your locality. Popular strains are Hale's Best, 88 days to maturity (Orange Flesh), Honey Rock, 85 days to maturity (Salmon Flesh), and Honey Dew, 110 days to maturity (Green Flesh). You may choose from Casaba, Honey Dew, Christmas Melon, and Persian or Odessa, and a multitude of melons of different form and flavor.

For many weeks you have carefully tended the vines, you have reduced the number of fruits so that those that remain might be benefited. How are you to know just when the fruits are ready to pluck? You press a thumb gently on the stalk of a selected fruit. If the stalk seperates easily from the fruit, then that fruit is ripe and ready. It is your reward.

Watermelons. The watermelon (*Citrullus vulgaris Schrad.*) is native to tropical Africa. In the wild it occurs in both the edible sweet and the inedible bitter types. It seems likely that seed of the sweet watermelon was brought to America during early Colonial days.

Much improvement has been made in this plant since those days. Originally a tropical plant grown only in the deep south, there are now available types suitable for growth as far north as Canada.

Watermelons thrive best in rich, rather sandy soil. They are recommended for acid and very acid areas and enjoy newly cleared land containing much leaf mold, or land where rotted stumps of trees have recently been incorporated with the topsoil. In general, their culture is the same as for muskmelons except that they require more garden space and that muskmelons thrive on a liberal amount of lime. The hills should be about eight feet apart each way.

As with muskmelons, watermelons offer a wide selection from which to choose. Even if your garden is located north of the latitude of Philadelphia you will find many types suitable for short summers. Early Northern Sweet, matures in 78 days, has formed fruit in all our northern states, many others mature around 88 to 90 days. Fine, large fruits are often produced on a vine which is not allowed to form more than two or three fruits, all others are picked off as soon as they set.

But whether you raise cantaloupes or watermelons you may be sure that your success will depend very largely upon the proper use of mellow compost humus. Both plants will survive upon combinations of topsoil and raw manure but every effort should be made to encourage truly healthy plant growth by the use of properly composted materials.

ODDS AND ENDS

COMPOST IN PALESTINE

Extract from a letter to Sir Albert Howard from Mr. Jacob Shwarzman, Ashdoth-Yaacow Settlement, Post Kinnereth, Palestine, dated November 8th 1944.

I am glad to inform you that the compost problem and particularly the Indore Process has already caught the attention of some of the leading farmers in this country, and I hope you will be interested to know that on the Acre Experimental Station, which is a governmental institution, the Indore Process is going on very well under the leadership of Mr. Aaronovitch, and that on quite a large scale. Even though your work is still a closed book for most of our farmers, as they do not read English, there are only a few who do not know of the new ideas proclaimed by you. This is, of course, due to the soundness of the ideas that have spread by rumour and from mouth to ear. A lot of people are anxiously awaiting the publication of *An Agricultural Testament* in Hebrew and I hope it will be a great success. I greatly estimate the work carried out on the Acre farm, because Mr. Aaronovitch will certainly let people know all practical results achieved. There is one more man, Mr. Gutfield, who works as an instructor on the treatment of manure heaps on behalf of the Department of Agriculture of the Jewish Agency. He, too, is much impressed by your work and he preaches your ideas everywhere. So I think there seems to be some real prospect for the Indore Process in Palestine. And, indeed, it is needed badly.

PURPLE CAULIFLOWER

As a member of your ever growing group against the use of chemicals for fertilizer, I have added to my mode of farming, no blanching. The sun does so much good we should not blanch any vegetables in order to get a pale or white product. With this thought in mind I tried the new early purple cauliflower last year. It is as beautiful as it is delicious. A sure header, ripens early, requires no tying, (as it is not blanched) can be used as a hot vegetable just like white cauliflower, with either cream sauce or butter, or as a cold vegetable in salad. When cooked is green like broccoli, but is far more delicate in flavor.

It's history is somewhat in the dark. It was first raised in Europe and for the last fifteen years has been raised and perfected by the James Gardens. I do hope that when the war is over it will be possible to find out it's early origin.

Mrs. Irene Grey.

—o—

RABBITS

Some people sprinkle wood ashes on their plants to keep rabbits away. A friend of mine used a very effective way this last summer. He put moth balls on a path around his entire vegetable garden. In other words, he kept the weeds down two or three feet beyond his garden and placed some of these moth balls into the ground. The ribbits would have had to pass this path of moth balls and they don't seem to like the smell. It would be best, of course, to keep these moth balls far enough away from the vegetables themselves so that the odor will not be absorbed.

Control of Peach Borers

By M. G. KAINS.
Author of Five Acres And Independence

EDITOR'S NOTE—Where the orchard has had the benefit of a few years of organic treatment such heroic measures as described herein will not be necessary.

SHORTLY after the forest had been cleared and the soil cleaned, my grandfather planted an excellent orchard of all kinds that can be grown in southern Ontario, Canada.

As the soil was "virgin," the trees thrived wonderfully, but so did the insects and, because their native enemies were deprived of the woods, the borers soon destroyed the young peach trees; the plums were killed off by black knot and all but three of the dozen or fifteen pear varieties by fire blight, because grandfather allowed grass, as was then popular, to grow around the trees, thus protecting the borers and not knowing how to fight these enemies.

More peach trees are destroyed by borers than by all other enemies put together, except the oriental fruit moth, because people don't work against them early enough to prevent or destroy them. Yet, this borer is one of the easiest insects to destroy or to protect the peach.

To fight *any* enemy—human or insect!—it is necessary, first, to know what it is; second, how it works; third, how to control or prevent its doing harm.

The female peach borer is steel blue in color with a beautiful orange band on the abdomen. At various times from the middle of June to late September in the neighborhood of New York City and, say, Pittsburgh, Pa., they may come out of their hiding, flying during the day, and lay their eggs—generally close to the ground on the trunks of the trees. Soon the eggs hatch and little worms gnaw their way through the bark and feed between it and the wood—completely protected against everything—poisons, caustics and liquids—except gases. Unfortunately these are destructive to other living creatures such as "angle" worms, bacteria, etc. There, the borers make tunnels until winter approaches, then they "sleep" until spring, when they eat ravenously until full grown. Then they change into moths and continue their "life history."

In the mid 1890's, Professor Mark Slingerland planted about 100 one-year old peach trees to discover, if possible, how to prevent or to control the borer. He tried every so-called method and suggestion then sent him—caustics, such as wood ashes; poisons, such as paris green; fly netting; trapping the moths. The only method he found practical was cutting each borer out individually. Incidentally, I may say that I have killed thousands of borers in this way but have never seen a living moth, which is easily mistaken for a wasp by the casual observer.

As the borers are very small during the summer, it is almost impossible to find them, so orchardists who practice this method wait until late October or early November. Then they hoe away the soil around

each trunk about five inches deep, all around, and hunt for the borers.

At that time they are easy to find because at the base will be a mass of amber-colored, jelly-like material with sawdust-like stuff—the "castings"—of the insects. Sometimes borers may be buried in this stuff but usually they are between the bark and the wood. Therefore, it is necessary to find little holes or soft spots in the bark to cut these open and destroy the white, brown-headed worms. Once-in-a-while there may be a soft spot—as between corners of two branches—where a borer has hid itself, but I doubt if I have found as many as a score.

As some may have been missed at the base, it is advisable to leave the soil openings thus for ten days or two weeks so the hidden ones will betray where they are by new "sawdust stuff" and be destroyed. Then the holes may be filled with soil, tramped hard and then heaped with still more.

Though cutting open the tree may seem to have done serious damage, this will have done far less harm than letting the worms continue to feed on them until, say June, because when spring comes the wounds will quickly recover with new growth.

The first year is naturally the most critical for the peach tree, less each succeeding year, because the trunks not only get larger and less likely to be damaged, but tougher and harder for the worms to eat and live.

Though most commercial peach growers do not take as good care as this, trees rarely live much longer than ten years, yet they can be made to bear well for twice as long. In fact, I know one commercial peach orchard 29 years old when I last visited it!

One way to protect peach trees, at least to some extent, is to keep the ground beneath them for at least a yard all around near the trunks, perfectly clear of grass and weeds, especially between Mid-May and Mid-August, so little birds can easily see and find the eggs and worms there before they gnaw their way into the wood.

Another way is (1) examine each newly bought nursery tree to discover and destroy every borer; (2) when the trees are planted, to force a piece of tin into the ground completely encircling each trunk with a space about two inches wide empty; (3) in Mid-May, fill this space with tobacco dust so it will become soaked by rain and thus destroy the little worms; (4) repeat this treatment each May. The tobacco being vegetable will in time become humus and do no damage to the tree or to anything else.

Still a third way is, after examining the nursery trees, as described, to swab each one, from the start of the roots up to the lowest branches, with tangle-foot before planting. This stuff will not dissolve or wash off but continue sticky for several months, thus either catch the moths or the little worms so they cannot penetrate the material or get into the bark.

The material will have lost most of its stickiness or become "checked" so it will be advisable, if not necessary, to apply a second, third, fourth and fifth spring. Nevertheless, before doing these second and later applications, it is advisable to hoe away the soil in Mid-April, leaving the ground open, first, to discover if any borer may have sneaked into the trunk, and second to let rain wash the ground off the trunks. After swabbing with the material, pile and tramp soil around each tree. By the time the trees are five or six years old the bark will be so large and so tough that the little worms will do little if any damage.

Earthworms in Winter Quarters

A keen observer reports on the habits of creatures which are useful to gardeners

Reprinted From Horticulture Magazine (Boston, Mass.)

THE earthworm to most of us seems of no possible use except as bait with which to catch fish. But this lowly creature is one of the gardener's best friends. Unseen, it works day and night, plowing, harrowing and fertilizing the soil for his benefit.

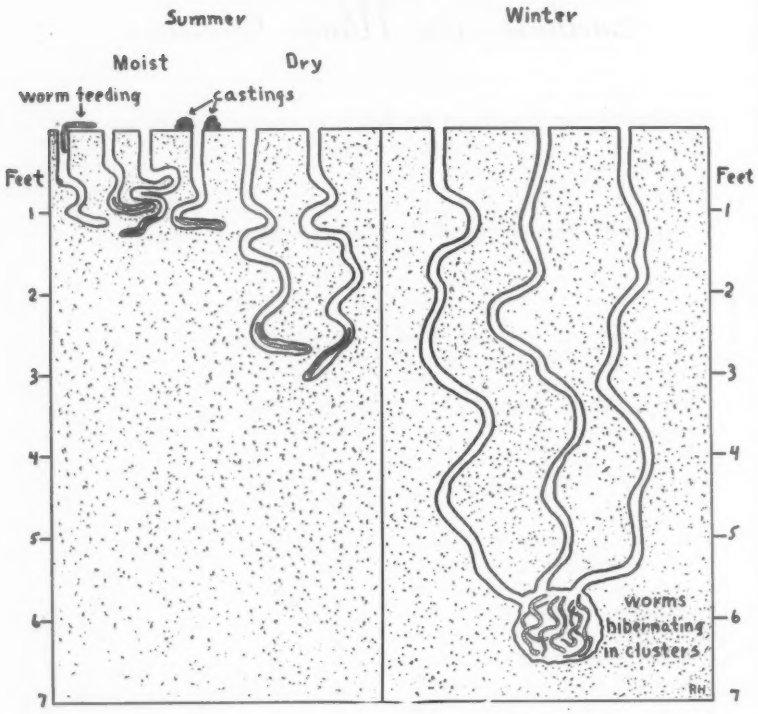
It digs into the earth from 12 to 18 inches, although at times it may go as deep as seven or eight feet, and brings the subsoil to the surface, which is just what we do when we plow. It also grinds this soil in its gizzard and thus breaks it up as we do with our harrow, incidentally turning out a soil of much finer texture than we can do either by harrowing or raking. It even adds a fertilizer to the soil, for it has glands which secrete lime that neutralizes the acids in it.

The earthworm, however, is not merely a tiller of the soil. It is an agriculturist as well, for it plants seeds fallen on the ground by covering them with soil which it brings up from below the surface and it further cares for the growing plants by cultivating the soil around the roots. Moreover, it provides enrichment by burying the bones of dead animals, along with shells, leaves, twigs and other organic matter which, upon decaying, furnish the necessary minerals to the plants. It even provides for drainage by boring holes to carry off the surplus water.

The earthworm, you see, is not so useless after all. The changing character of the landscape and much of the beauty of our fields and forests can be attributed to the labors of this diminutive workman. Ruins and many ancient works of art have been preserved by it for us. And the success which you may have with your garden next year may be determined in no small measure by the number of these animals in your plot. Remember all this the next time you impale one of them on a hook for a few moments' pleasure.

The earthworm spends most of its time in the ground, where it lives in a burrow. The burrow, as a rule, extends straight down at first and then winds about irregularly, and towards the surface is lined with a thin layer of fine, dark colored earth voided by the worm. The familiar "castings" are formed with excreted earth and are made by the tail, which the animal uses as a trowel.

The earthworm cannot live in dry ground, it must have moisture. It does not like loose sand either, for it cannot build its burrow with sand grains, but must have materials with more plasticity. It thrives best in moist, well-aired soil that is rich in organic matter and



that is neither acid nor alkaline. The most favorable times of the year from the viewpoint of moisture and temperature are Spring and Autumn. On warm, moist nights of early Fall we can find earthworms in large numbers on the surface of the ground but with the first hint of freezing they disappear.

At this time they do not go deep into the ground, but remain near the surface and reappear on warm nights. As cold weather gradually sets in, they go into the ground from three to six feet below the surface, the depth depending upon the frost line, and gather by the dozens or hundreds in rounded chambers, huddling together in close-packed balls to conserve their moisture.

Here they remain until the Spring sun has completely thawed the ground, when they begin to reappear on the surface. Spring is the main breeding season and on moist nights in May and June we may find hundreds of mating pairs within a few square feet of lawn or garden soil. The eggs are laid in yellowish-brown capsules, which are shaped like a football and are about the size of apple seeds.

The earthworm is strictly nocturnal in habits and is not found outside of its burrow during the day unless "drowned out" by a heavy rain. During the day, when the ground is moist and warm, it lies in its burrow extended full

length, with its head uppermost and near the surface. It is in such a position that it is detected by some keen-eyed bird and sacrificed as a meal. You have doubtless seen, on countless times, some bird tugging away at a protesting worm and perhaps you have even tried to pull one out of its burrow yourself, only to find this is not easy to do.

The reason is that the earthworm possesses numerous tiny, bristle-like projections or setæ, which serve as anchors upon being embedded into the walls of the burrow. These setæ, which are moved by muscles, are also used in locomotion and serve the same purpose as the scales on snakes.

The earthworm moves about by a peculiar, crawling movement which is produced by two sets of muscles which are to be found directly under the skin. One set runs in a circular direction around the body, the other lengthwise. When the animal crawls forward, the anterior region is moved forward by the contraction of the circular muscles in this region. The anterior region is then anchored to the ground by the setæ, which can be turned so that they point in the opposite direction from that in which the animal is moving, and a posterior portion is drawn up by the contraction of the longitudinal muscles. This portion is then anchored in like manner as the anterior portion, and a more posterior portion is drawn up, the process continuing until the entire length of the animal has been moved forward.

For some reason, the earthworm cannot seem to find its way back to its burrow if it leaves it and so it anchors itself by its tail to the walls of its home while it stretches itself over the surface of the ground in search of food. The earthworm is an omnivorous creature and includes in its diet earth, leaves, flowers, raw meat and fat, even at times exhibiting cannibalistic tendencies by eating fellow earthworms.

Generally the earth which the earthworm swallows is the earth which it excavates in making its burrow and later ejects as "castings." Darwin estimated that one acre of ground may contain as many as 50,000 earthworms and that they may carry more than 18 tons of soil to the surface in a single year, while in 20 years they may transfer a layer of soil some three inches thick. He also speaks of a stony field which was so changed after 20 years that a horse could gallop over it from one end to the other without striking a single stone.

The earthworm has no ears and is completely deaf, yet is sensitive to vibrations. It will make no response to musical tones but if placed, for example, in a flower pot, it will draw back into its burrow immediately when a note is struck if the flower pot is placed upon a piano.

The earthworm has no eyes, yet is very sensitive to light, for if a beam of bright light is thrown upon it it will "dash like a rabbit" into its burrow. Its sense of taste is well developed, for it exhibits preferences for certain kinds of food. Its sense of touch is very acute, too, for it lives where its body comes in contact with solid objects and apparently likes to feel the walls of its burrow against its body. But I am not sure that I can agree with Dr. Jordan, when he says that the earthworm is perfectly at home on a hook nor when he says that in such a position it rests "peacefully."

—Richard Headstrom.
Boston, Mass.

Interesting Convert

"Having handled fertilizer materials since 1898 and having become much concerned as to what the farmers would do after their land became concrete (almost), like my own little garden, it looked as though I found the answer when I encountered your various articles on Organic Gardening."

Name and address withheld by Editor.

California Compost

Organic Gardening Magazine:

The enclosed snapshots are of my last year's compost heap and new one in the making. Both by "Indore" process. The old one (almost used up) was finished this time last year and left till fall without turning. Both heaps are made

I make garden under desert conditions—poor sand—long hot season—drying winds and no rain from April to November, so I sure appreciate compost.

I enjoy "Organic Gardening" very much. It gives me added interest in my hobby, further education and moral support.

8 ft. by 5 ft. with rabbit dropping and powdered shell for lime. To keep from drying out I tramp down each layer of vegetable matter. This is especially necessary here as it seems to me our vegetation (because of quick growth) is of very light texture.

Sincerely,
Mrs. R. A. Driscoll,
Fontana, Calif.

(Editor's Note:— Where water is available one should not tramp down or walk on heap).

Reader's Correspondence

PLEASE WRITE ON ONE SIDE ONLY.
Send stamped, self-addressed envelope for reply.

DEFINITION

Dear Mr. Rodale:

I want a definition for "organic gardening." Is it not a form of rotation—putting back in the ground the natural elements taken out by plant growth?

Mrs. F. W. Mueller,
Baltimore, Md.

Answer

Dear Mrs. Mueller:

I would say that Organic Gardening is gardening in a way as close to nature as is practical under present day conditions. Nature does not use strong chemicals. Nature always uses a mixture of animal and plant matter as a fertilizer. One without the other would represent an unbalanced agriculture or gardening. Nature, in effect, rotates her crop by not planting one kind of crop only in one place. She, as a rule, plants a conglomeration in one spot. That is, there may be over thirty kinds of weeds growing in a limited space. Man, however, just tries to place one kind of crop in one spot.

It may be that some time in the future, some one might work out a plan of mixing together a lot of different kinds of vegetable seeds and growing them in that manner, rather than in neat rows or in sections containing one kind of vegetable.

Sir Albert Howard briefly touches upon this thought in his new book called "Farming and Gardening for Health and Disease", which we will publish about six months from now.

—o—

COMPOST
(*Amount Needed*)

Dear Mr. Rodale:

Would you be good enough to inform me as to how much phosphate rock is to be used per acre. Also how much compost (by the yard) should be placed on the fields. You know, farmers measure fertilizers by the yard, not by the ton.

Chas. J. Berg,
Berkeley, Calif.

Answer

Dear Mr. Berg:

It is advisable to use between one and two tons of phosphate rock per acre. Regarding the weight of compost, one cubic foot would weigh about fifty pounds. Therefore, a compost heap twenty feet long by ten feet wide and which has become condensed to three feet high, should amount to about four hundred cubic feet. This makes somewhat of an allowance for the slanting sides of the heap. Since each cubic foot amounts to fifty pounds, then this heap would total twenty thousand pounds or ten tons. It is usually recommended that ten tons of compost be used to

the acre, but after five years or more, only five tons per acre are necessary.

In farming the compost does not have to be applied to every acre every year. In some cases a farmer will apply it only on his corn crop in the rotation. Personally, I would rather use five tons to the acre and treat the whole farm rather than to apply it only with certain crops.

—o—

FRESH MANURE

Gentlemen:

Two summers ago I planted six dozen tomato plants. I dug a hole for each plant and mixed pig manure (not very old) in each hole. I used the Victory fertilizer and kept the plot free from weeds. I had a very good crop.

This last summer I planted the same number of plants. This time I dug for each plant, but used cow manure instead of pig. This manure was also too fresh. I used no commercial fertilizer. To avoid weeding I put a four inch mulch of strawy manure, straw, leaves, or anything available, over the entire plot. We also used a rototiller this second year. We got exactly two and a half times as many tomatoes as the year before. Considering that we had no rain for several months last year and also that at least a third of the plants were a total loss due to blossom end rot, this was rather amazing.

In considering the extent of this disease, I have come to the conclusion that at least two of the causes were the following. (1) Manure too fresh. (2) The soil on the surface was too busy digesting the mulch to be healthy for the upper layer of tomato roots.

I had no compost to use last year, but next summer, I hope to have at least a little to experiment with.

Catherine White Leonard,
(Mrs. Parker Leonard)
Essex, Conn.

Answer

Dear Mrs. Leonard:

I believe your main trouble was using fresh manure. That is a violation of a basic principle in organic gardening. I am sure that the mulch had nothing to do with the disease. It is a known fact, however, that

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using fresh manure is a contributing factor in the production of disease. When you use compost in the coming season, I am sure you will be pleasantly surprised.

—o—

BONE-MEAL

Dear Mr. Rodale:

As a subscriber to your magazine I have followed your recommendations to use bone-meal as a fertilizer when other "naturals" are not available. The last lot of bone-meal I purchased did not seem to have any value to it as the plants did not respond to its use. I would like to know if there is any quality or grade we should watch for when buying bone-meal, or is it all alike in quality.

I would also like to know if you recommend the use of well known chemical soil testing sets in determining the condition of the soil for phosphate, nitrogen, and acid condition of the soil?

R. C. Kiley,
Detroit, Mich.

Answer

Dear Mr. Kiley:

Theoretically, the value of bone-meal depends on the animal from which it comes. If it happens to come from an animal that has been fed on food grown with much chemicals, naturally, its bones would be less organic and would be more resistant to decay.

Schreiner, Merz, and Brown of the U. S. Dept. of Agriculture say: "Bonemeal, either raw or steamed, when sufficiently fine, rates well as a source of phosphorus and to a considerable degree its value is increased by its nitrogen content. Its lasting character and its safety make it very serviceable to green-

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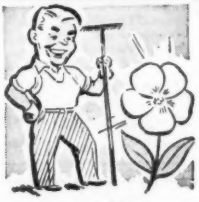

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house and other specialists. Because the phosphorus in bonemeal becomes available slowly, it is effective for more than one season. It is best applied to mellow soils containing an ample supply of organic matter."

Bonemeal usually takes from four to six months to decay in the soil. It is best, therefore, to place it in the compost heap so that it will decay there before being used on the land. It does not harm testing your soil with the various soil testing sets. There are many times where this may help.

—o—

SOOT

Dear Mr. Rodale:

I have quite a lot of material on hand at present to start a compost pile. I also have about three apple boxes full of soot (chimney soot) which I am told contains about 3% of nitrogen. Am wondering if this could be worked into the compost pile and how. Should it be sprinkled in amongst the weeds etc. or could it be placed on an inch or so thick? There is no doubt a best way. Thought I would use it inasmuch as I have it.

Stanley Partridge,
Garibaldi, Oregon.

Answer

Dear Mr. Partridge:

Under no circumstances would we recommend the use of chimney soot. This is highly charged with sulphur and is much too strong for use as a fertilizer. The fertilizer experts are universally agreed upon the fact that the nitrogen percentage of chimney soot is very low, usually less than half of one per cent. Its carbon content is valuable, but the

quantities of ammonia and sulphur oxides also present make soot actually equivalent to ammonium sulphate, which we have always rejected. If your soot comes from wood fires, it would be a different matter, which might be used with advantage.

—o—

DEFICIENCY OF SOILS

Dear Mr. Rodale:

Recently I came across an address presented by Mr. Lee Vanderlinden, Chief of the Research Department of The Chas. H. Lilly Co., Seattle, this address being published in the September, 1944 issue of New Agriculture. Mr. Vanderlinden claims that the following important minerals are being completely taken out of the soil either by erosion or crops and that they must be reincorporated in the soil in order to obtain healthy growth of animals:

Calcium, nitrogen, potash, phosphate, sulphur, iodine, boron, manganese, copper, iron, zinc, magnesium and cobalt.

Depleted soils will have lost many of these minerals so that the compost will contain only such minerals as are left. The query in my mind is: How can these minerals be put back into the soil except artificially?

Also the mineral copper—does that mean the use of the copper as it comes from the mines?

W. J. Coad,
Omaha, Neb.

Answer

Dear Mr. Coad:

We usually advise where there is a question of a local deficiency of the soil that certain amendments be used, such as ground limestone,

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You Then Lack Fluorine in Your Diet. Newest Researches Show that Most Soils and Foods Today are Very Deficient in Fluorine, and that FLUORINE DEFICIENCY is the cause of dental decay. For in Deaf Smith County, Texas, where the Soil is Rich in Fluorine, TOOTH DECAY IS UNKNOWN.

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dolomite and raw phosphate rock, which will give you most of the elements that are needed. Where there is no question of a soil deficiency, it is safe to farm with compost that originates on the farm provided that leaves are used in making the compost along with other green matter because the trees have roots that extend for 20 to 25 feet down and bring up rare elements from a part of the earth that has not yet been exhausted as the surface has.

Referring to your question as to copper, there are two kinds of metals, inorganic and organic. The inorganic form is the copper as it comes from the mines in its pure metallic form but organic copper is the form that the plant and the body prefer. Where much compost is used, there will be much mineral matter in the organic form. Please bear in mind also that the chemists have built up their own chemical structure as far as the needs of the soil are concerned. They have practically completely overlooked the biological aspect of soil fertility which, to my way of thinking, is much more important.

If your soil is rich with bacteria, earthworms, etc. and if you make composts, you will find that there will be greater health for your crops as well as for those that consume them.

—o—

FLOWER POTS

Dear Sir:

Do I use compost alone in flower pots, or do I mix it with garden soil?

Mrs. Marcella Ulrich,
Vandalia, Mich.

Answer

Dear Madam:

Compost should not be used

alone, but should be mixed with soil. If you make your own compost, try and apply friction to it and get it very fine before using it in a flower pot. Then it should be mixed about one third compost and two thirds rich soil.

—o—

EVERGREENS

Dear Mr. Rodale:

Could you tell me what is wrong with my shrub; it is a spreading Juniper or savin, it is getting brown in places and it has very small white specks. What is the right kind of fertilizer for this shrub?

Michael Zavosnik,
Rocky River, Ohio.

Answer

Dear Sir:

It is best not to use any commercial fertilizers with your evergreen shrub plants, which prefer a somewhat acid condition. Therefore, do not use any lime or wood ashes or alkaline water with such plants. The purchased type of peat humus is good because it is always acid. Regular compost, that is made with lime, however, will not hurt. A mulch of leaf mold, peat moss, sawdust or other acid materials, is helpful.

The browning of the leaves, which you describe, is sometimes a sign of injury rather than of disease. Such a bruise will sometimes make an entire branch turn brown. It may also be due to dry weather.

Whitespot appears in very hot weather, especially where the soil is very dark and porous. It is a fungous disease due to the surface heating of the soil. If you have such a soil, the plant should be given frequent light watering. You might also lighten such soil by mixing in other lighter soil.

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